

What is claimed is:

1. An apparatus for fabricating nanostructure-based devices on a workpiece, the apparatus comprising:

a stage for supporting a workpiece, said workpiece having catalyst deposited thereon, said workpiece including multiple work regions, said multiple work regions hereinafter referred to as dies;

a radiating-energy source configured to directly heat catalyst on at least one die via simultaneously emitted multiple prongs of radiating energy; and

a feedstock delivery system for delivery of feedstock gas to said catalyst.

2. An apparatus according to claim 1, wherein said radiating-energy source is a laser source, and said multiple prongs are multiple laser beams.

3. An apparatus according to claim 2, wherein said multiple laser beams comprise a type selected from the set consisting of YAG, excimer, CO₂, argon, helium-neon, ruby, neodymium glass, semiconductor, and free electron.

4. An apparatus according to claim 2, wherein said multiple laser beams originate from a single laser split by at least one beam splitter.

5. An apparatus according to claim 2, wherein said multiple laser beams comprise at least 10 laser beams.

6. An apparatus according to claim 1, wherein said radiating-energy source includes a focused acoustic, focused radio frequency (RF), focused infrared (IR), or focused microwave source.

7. An apparatus according to claim 1, wherein said multiple prongs are positioned and aligned so that all catalyst throughout said die that are desired for seeding growth are irradiated.

8. An apparatus according to claim 1, wherein said multiple prongs are positioned and aligned so that all catalyst throughout said die that are desired for seeding growth are irradiated in multiple irradiating periods, in which a set of islands of catalyst irradiated in a first irradiating period is not identical to a set of islands of catalyst irradiated in a second irradiating period.

9. An apparatus according to claim 1, wherein said multiple prongs are positioned and aligned so that all catalyst throughout said die that are desired for seeding growth are irradiated in multiple irradiating periods, in which each period of said multiple periods uses a different set of fabrication parameters.

10. An apparatus according to claim 1, wherein a plurality of said multiple prongs are produced by a beam splitter from beams that number fewer than said plurality.

11. An apparatus according to claim 1, wherein said feedstock delivery system is positionable at least in distance normal to said die, and in direction of gas flow toward said die.

12. An apparatus according to claim 1, wherein said feedstock delivery system is positionable in X, Y, and Z directions.

13. An apparatus according to claim 1, wherein said stage can be translated or rotated relative to the radiating-energy source, whereby any die among said workpiece is capable of being positioned for exposure to said radiating-energy source.

14. An apparatus according to claim 1, wherein at least a portion of said radiating-energy source can be translated or rotated relative to said stage, whereby said multiple prongs are capable of being selectively positioned for radiating energy onto any given die of a workpiece.

15. An apparatus according to claim 1, wherein said stage includes a stage temperature-control unit for helping to control temperature of a workpiece.

16. An apparatus according to claim 15, wherein said stage temperature-control unit is one that is capable of cooling a workpiece from equilibrium room temperature or a processing temperature to as low as -250 degrees Centigrade.

17. An apparatus according to claim 15, wherein said stage temperature-control unit is one that is capable of heating a workpiece from 0 degrees Centigrade or the equilibrium room temperature to 1200 degrees Centigrade.

18. An apparatus according to claim 1, wherein said apparatus is for fabricating carbon nanostructure-based devices.

19. A method for fabricating nanostructure-based devices on a workpiece, the workpiece including multiple work regions, the method comprising:

positioning a work region of said workpiece, and an energy emission system, in alignment for said energy emission system to radiate energy toward a surface of said work region, said surface being within a chamber;

flowing feedstock gas to said surface of said work region; and
emitting simultaneously multiple prongs of radiating energy from said energy emission system externally onto said surface of said die, to thereby heat catalyst on said surface of said die, wherein a nanostructure is formed at said heated catalyst.

20. A method according to claim 19, wherein said multiple prongs comprise multiple beams of laser.

21. A method according to claim 20, wherein said emitting step comprises using a beam splitter to split one or more laser beams into a greater number of laser beams for emission.

22. A method according to claim 19, wherein said emitting step comprises simultaneously irradiating a first plurality of islands of catalyst on said work region in a first period of operation, then irradiating a second plurality of islands of catalyst on said work region in a second period of operation, wherein fabrication parameters used in said first period of operation differ from fabrication parameters used in said second period of operation.

23. A method according to claim 22, further comprising positioning said feedstock delivery system, using a computer-controlled positioning system, to control said flowing of said feedstock gas, at least in distance normal to said die, and in direction of gas flow toward said die.

24. A method according to claim 19, wherein said positioning step comprises translating or rotating said stage relative to said energy emission system, to position said work region for exposure to said energy emission system.

25. A method according to claim 19, further comprising actively transferring heat to or from said workpiece via said stage, and controlling said transferring using feedback from a temperature sensor affected by temperature of said workpiece.

26. A method according to claim 25, wherein said actively transferring comprises cooling said workpiece from equilibrium room temperature, or from a temperature encountered during said fabricating, to a temperature below a predetermined threshold.

27. A method according to claim 25, wherein said actively transferring comprises heating said workpiece from equilibrium room temperature, or a temperature encountered during said fabricating, to a temperature above a predetermined threshold.

28. A method according to claim 19, wherein said apparatus is for fabricating carbon nanostructure-based devices.